

APPENDIX N

*CALFED Bay-Delta Program
Appendices - Phase 1 Summary Report*

DRAFT June 21, 1996

Alternative A

Extensive Demand Management

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at a higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 800 to 1,200 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 75 to 125 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 400 to 800 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 750 to 1,250 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt. Provides rearing areas for salmon. Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks).

Activities	Benefits
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. Reconstruct river banks and shallow water habitat on 50 to 75 miles of leveed banks along the Sacramento River. Protect and enhance 300 to 500 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restoration of floodway corridor habitat. Modify floodways to convert 5,000 to 7,000 acres of production agricultural lands to wetland habitat. 	<ul style="list-style-type: none"> Provides spawning areas for Delta native fish. Improves wildlife habitat. Improves forage areas and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> Delta Shallow Water Habitat – Candidate areas for restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Delta Levee Habitat – Candidate levees for restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. Floodway Corridors – Habitat restoration must not impair capacity of floodway. Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Convert one or more Delta islands to create new, environmentally dedicated, in-Delta storage with approximately 100,000 AF capacity with a new screened diversion facility to divert flows into storage. 	<ul style="list-style-type: none"> Provides additional diversion flexibility Reduces entrainment of fish Reduces frequency and duration of export curtailments, thus improving water supply reliability Improves fish transport through Delta Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2. Could provide added flexibility for water transfers.
Considerations	
<ul style="list-style-type: none"> Locate new environmentally dedicated Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria. Divert water into island storage during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and release water to move fish or release for diversion. Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> Block fish movement into Old River Manage water flows and stages down Old River 	<ul style="list-style-type: none"> Encourages outmigrating salmon to stay in San Joaquin River. Allows management of flows and stage in Old River. Improves water quality in the south Delta.
<ul style="list-style-type: none"> Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> Increases fish survival. Improves operational flexibility of facility.
<ul style="list-style-type: none"> Install fish screens on high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> Improve fish screening capability at existing export diversion facilities. 	<ul style="list-style-type: none"> Reduces entrainment of fish at export facilities.
<ul style="list-style-type: none"> Construct a new screened intake for the State Water Project at Italian Slough 	<ul style="list-style-type: none"> Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.

Considerations

- Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility.
- New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake.

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. • For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. • To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta land use and infrastructure to inundation • Reduces vulnerability of Delta water quality to salinity intrusion • Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation • Provides greater opportunities for habitat restoration
<ul style="list-style-type: none"> • Maintain flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta functions to inundation. • Maintains flood conveyance capacity in high priority channels. • Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> • Integrate protection and stabilization of levees with Delta habitat restoration activities. • Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts. • Integrate channel improvements with levee improvements. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Expand the use of water transfer as a major water management tool for ensuring the reliability and predictability of water supplies. 	<ul style="list-style-type: none"> Encourages conservation practices which could make water available for transfers. Encourages land fallowing on marginally productive lands which contribute to water quality problems. Increase water supply reliability without development of new large-scale projects.
<ul style="list-style-type: none"> Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 1 million to 2 million AF through use of incentives and other programs. Permanently retire approximately 750,000 to 850,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> Reduced demand for Delta water exports. Could make water available for transfers. Provides water quality benefits in the San Joaquin River and south Delta by retiring lands that contribute to drainage problems along the San Joaquin River. Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> Expand groundwater banking and conjunctive use in Delta export areas such as the San Joaquin Valley and the Tulare Lake Basin and in the Sacramento Valley. 	<ul style="list-style-type: none"> Improves operational flexibility of Delta exports. Allows a portion of Delta exports to be shifted away from fish sensitive periods. Could make water available for transfers. Reduces fish entrainment at Delta pumping facilities.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 400,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 400,000 to 600,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Implement wholesale inclining block rates and water pricing structures for water users to encourage conservation activities. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Provides incentive for increased efficient use of water.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 800,000 to 1 million AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality through effective and appropriate reclamation activities.
<ul style="list-style-type: none"> • Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> • Improves flexibility of system operations. • Increases water supply reliability.

Considerations

- Water transfer would be developed in conjunction with urban and industrial conservation, agricultural conservation, water pricing practices, reclamation projects, and conjunctive use programs which develop new transferrable supplies.
- Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality.
- Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers.
- Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable.
- Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods.
- Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable.

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> • Reduces fish losses due to predation. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> • Improve fish salvage procedures using best available technology. 	<ul style="list-style-type: none"> • Reduces fish take at the CVP/SWP pumping facilities.
<ul style="list-style-type: none"> • Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.
Considerations	
<ul style="list-style-type: none"> • Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> • Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> • Conduct net-pen rearing of striped bass for about 100,000 fish to supplant natural production. 	<ul style="list-style-type: none"> • Maintains recreational fishery. • Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Manage drainage timing (i.e., restrict drainage discharges by 20 to 30 percent during periods of low Delta inflow) to reduce instream impacts of water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> • Construct wetlands to treat 3,000 to 5,000 AF of upstream wastewater effluent and Delta agricultural drainage. 	<ul style="list-style-type: none"> • Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> • Increase enforcement of source control regulations for agricultural drainage to moderately: <ul style="list-style-type: none"> • Reduce leachate concentrations and volumes. • Restrict spray programs adjacent to waterways. • Reduce runoff volumes. • Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> • Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.

<i>Draft Alternatives Activities</i>	<i>Appendix N</i> Benefits
<ul style="list-style-type: none"> • Coordinate incentives for developing efficient water quality management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Improves overall Delta and tributary water quality by more efficient management of water resources through transfers, conservation, conjunctive use, etc.
<ul style="list-style-type: none"> • Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> • Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> • Reduces future tributary and Delta heavy metals loading.
Considerations	
<ul style="list-style-type: none"> • Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries. • Identify priority sources and provide regulatory and economically effective institutional incentives for implementation. • Remediation actions should include consideration of surface regrading, revegetation, and hydraulic works for infiltration control, and mine drainage handling (e.g. discharge reuse, evaporation ponding, regulated discharge, rerouting) and treatment (e.g. mine sealing, limestone neutralization, etc.) • Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on wastewater treatment plant improvements. • Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution. • Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> • Establish landside buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> • Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.

Activities	Benefits
<ul style="list-style-type: none"> Establish and recommend modest funding for an emergency levee management program that provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. Identify funding sources for continuing levee maintenance activities beyond the planning horizon of this program. Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. Provides funding for continued maintenance of levees to protect Delta functions. Increases the reliability for water supply needs from the Delta.
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee improvements and buffer zone programs. Buffer zones may be managed to provide wildlife habitat. Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin. Emergency levee management program would not replace other levee maintenance or improvement programs. Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> Provides additional habitat restoration. Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.

Activities	Benefits
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Enforcement of real economic penalties can result in improved management practices that can improve tributary and Delta water quality.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Improves Delta water quality and in-Delta and anadromous fish habitats. Improves habitat quality and management practices in areas outside of CALFED's geographic scope, but within the area of influence for the Bay-Delta.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordinate with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Long-term planning for drought contingencies. <ul style="list-style-type: none"> • Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> • Improve drought response planning. • Increases water supply reliability. • Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> • Ease institutional barriers to facilitate water transfers. • Improve planning and coordination procedures for water transfers. • Improve operational procedures to facilitate water transfers. • Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> • Increases the efficiency of implementing water transfers. • Increases financial position of otherwise economically marginal projects that increase water supply flexibility. • Increase water supply reliability and predictability.
<ul style="list-style-type: none"> • Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> • Develop incentives for local and regional coordination of land use and water supply planning. • Implement long-term institutional measures to increase coordination of state/federal project planning and operations with local and regional water planning and operations. 	<ul style="list-style-type: none"> • Provides greater flexibility for short-term transfer water during drought contingencies. • Increases the efficiency of water supply planning. • Ensures beneficial uses of existing water supplies.
<ul style="list-style-type: none"> • Establish incentives for extensive amounts of long-term conjunctive use in the southern San Joaquin Valley and ease institutional barriers. 	<ul style="list-style-type: none"> • Increase operational flexibility for water supplies. • Could make water available for transfers.
Considerations	
<ul style="list-style-type: none"> • Determine institutional needs to implement long-term drought planning programs • Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. • Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	

Alternative B

New Storage to Improve Delta Flow

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features

Habitat Restoration

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,000 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt Provides rearing areas for salmon Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply reliability from the Sacramento River and its tributaries Improves food supply availability for fish. Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to: <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> • Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • Floodway Corridors – Habitat restoration must not impair capacity of floodways. • Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. • Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Construct new or expand existing upstream storage with approximately 500,000 to 1 million AF capacity. Construct new or expand existing downstream storage with approximately 500,000 to 1 million AF capacity. 	<ul style="list-style-type: none"> Provides additional storage and operational flexibility for supply, quality, and environmental needs. Allows diversions to be reduced during times of greater environmental sensitivity, and increased at times of reduced environmental sensitivity. Increases the opportunity for water transfers.
Considerations	
<ul style="list-style-type: none"> Environmentally dedicated water in upstream storage allows reduction in diversions during critical fishery periods. Upstream storage could be located in either Sacramento River or San Joaquin River basins. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> Block fish movement into Old River. Manage water flows and stages down Old River. 	<ul style="list-style-type: none"> Encourages outmigrating salmon to stay in San Joaquin River. Allows management of flows and stage in Old River. Improves water quality in the south Delta.
<ul style="list-style-type: none"> Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> Increases fish survival. Improves operational flexibility of facility.
<ul style="list-style-type: none"> Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> Improve fish screening capability at existing export diversion facilities. 	<ul style="list-style-type: none"> Reduces entrainment of fish at export facilities.
<ul style="list-style-type: none"> Construct a new screened intake for the State Water Project at Italian Slough. 	<ul style="list-style-type: none"> Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
<ul style="list-style-type: none"> Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> Increases fish survival.
Considerations	
<ul style="list-style-type: none"> Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. <ul style="list-style-type: none"> • For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. • To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta land use and infrastructure to inundation. • Reduces vulnerability of Delta water quality to salinity intrusion. • Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. • Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> • Improve flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta functions to inundation. • Improves flood conveyance capacity in high priority channels. • Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> • Integrate protection and stabilization of levees with Delta habitat restoration and water transport activities. • Candidate areas for P.L.99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts. • Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions and should be integrated with levee improvements. • Improvements to channels include dredging for sediment removal in channels with restricted flood capacity. • Evaluate combination of floodway capacity and reservoir flood reservation. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 300,000 to 400,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring lands that contribute to drainage problems along the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and extensive conjunctive use programs integrated with surface storage in the San Joaquin Valley and Tulare Lake Basin and in the Sacramento Valley. 	<ul style="list-style-type: none"> • Improves operational flexibility of Delta exports. • Improves water supply reliability and predictability. • Improves drought year water supply reliabilities. • Could make water available for transfers.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality through effective and appropriate reclamation activities.
<ul style="list-style-type: none"> • Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> • Improves flexibility of system operations. • Increases water supply reliability.

Considerations

- Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality.
- Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers.
- Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water that are not reusable.
- Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years.
- Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable.

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> • Improve fish salvage procedures using best available technology. 	<ul style="list-style-type: none"> • Reduces fish take at the CVP/SWP pumping facility.
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> • Reduces fish losses. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> • Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.

Activities	Benefits
<ul style="list-style-type: none"> Expand permitted pumping capacity of the CVP and SWP south Delta facilities to their full physical capacity during windows when fish are less vulnerable to pumping effects (e.g., late Fall to early Winter). 	<ul style="list-style-type: none"> Increase operational flexibility of Delta exports. Reduce pumping effects on aquatic species of special concern. Improve ability to ensure water supply reliability and predictability. Increase yield both from the Delta and from upstream reservoirs due to reoperation practices and shifted Delta exports.
Considerations	
<ul style="list-style-type: none"> Increased pumping capacities at CVP/SWP south Delta facilities will be guided by real-time monitoring programs. San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows. Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users. Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> Conduct net-pen rearing of striped bass for about 100,000 fish to supplant natural production 	<ul style="list-style-type: none"> Maintains recreational fishery. Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Dilute pollutants in Delta inflows from San Joaquin river using 50,000 to 100,000 AF of stored water. 	<ul style="list-style-type: none"> • Improves Delta water quality by providing a source of manageable dilution flows that can be released during low-flow/high drainage discharge periods.
<ul style="list-style-type: none"> • Manage drainage timing (i.e., restrict drainage discharges by 60 to 70 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Treat 20 to 30 percent of agricultural drainage to remove pollutants, to either be reused or used as part of a localized drainage management practice in coordination with the management of drainage timing, to reduce impacts to water quality. 	<ul style="list-style-type: none"> • Provides additional dilution flows for improving the quality of receiving waters in-Delta and to Delta tributaries.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> • Construct wetlands to treat 10,000 to 15,000 AF of upstream wastewater effluent and Delta agricultural drainage. 	<ul style="list-style-type: none"> • Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> • Increase enforcement of source control regulations for agricultural drainage to extensively: <ul style="list-style-type: none"> • Reduce leachate concentrations and volumes. • Restrict spray programs adjacent to waterways. • Reduce runoff volumes. • Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> • Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> • Coordinate incentives for developing efficient water quality management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Improves overall Delta and tributary water quality by more efficient management of water resources through transfers, conservation, conjunctive use, etc.
<ul style="list-style-type: none"> • Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.

Activities	Benefits
<ul style="list-style-type: none"> • Provide incentives for filtration system upgrades or watershed protection program development to improve source drinking water quality to meet EPA Drinking Water Quality Standards. Prioritize targeted recipients using criteria that includes, but is not limited to, number of service connections and upgrade costs needed to meet Maximum Contaminant Level Goals. 	<ul style="list-style-type: none"> • Improves source drinking water quality. • Directs funding to highest priority needs.
<ul style="list-style-type: none"> • Provide incentives for phased conversion of municipal treatment facilities from processes resulting in high disinfection byproduct precursor discharges to processes that do not produce DBP's. 	<ul style="list-style-type: none"> • Reduces concentration of compounds contributing to trihalomethane formation potential and degradation to drinking water supplies.
<ul style="list-style-type: none"> • Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> • Reduces future tributary and Delta heavy metals loading.
<ul style="list-style-type: none"> • Study and implement actions to reduce effects of salinity in the San Joaquin River, to maintain water levels and circulation in the south Delta, and to reduce recycled salt load to the San Joaquin Valley. 	<ul style="list-style-type: none"> • Better manage flow circulation. • Increase water stages for the south Delta. • Improve San Joaquin River and south Delta water quality.
Considerations	
<ul style="list-style-type: none"> • Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries. • Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc. • Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements. • Potential benefits of south Delta stage, circulation, and water quality actions need to be verified. • Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution. • Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> Establish land side buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> Buffer zones provide an increase in stability of adjacent levees. Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> Establish and recommend modest funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. Identify funding sources for continuing levee maintenance activities beyond the planning horizon of this program. Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. Provides funding for continued maintenance of levees to protect Delta functions. Increases the reliability for water supply needs from the Delta.
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee improvements and buffer zone programs. Buffer zones may be managed to provide wildlife habitat. Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin. Emergency levee management program would not replace other levee maintenance or improvement programs. Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> Provides additional habitat restoration. Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Enforcement of economic penalties can result in improved management practices that can improve tributary and Delta water quality.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin Valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.
<ul style="list-style-type: none"> Long-term planning for drought contingencies. <ul style="list-style-type: none"> Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> Improve drought response planning. Increases water supply reliability. Can be implemented with conjunctive use programs.
<ul style="list-style-type: none"> Ease institutional barriers to facilitate water transfers. Improve planning and coordination procedures for water transfers. Improve operational procedures to facilitate water transfers. Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> Increases the efficiency of implementing water transfers. Increases financial position of otherwise economically marginal projects that increase water supply flexibility. Increases water supply reliability, predictability, and flexibility.
<ul style="list-style-type: none"> Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> Develop incentives for local and regional coordination of land use and water supply planning. Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional water planning and operations. 	<ul style="list-style-type: none"> Provides greater flexibility for short-term transfer water during drought contingencies. Increases the efficiency of water supply planning. Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none"> Determine institutional needs to implement long-term drought planning programs. Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	

Alternative C

Dual Delta Conveyance

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,000 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> • Restoration of-Delta Terrestrial Habitat. <ul style="list-style-type: none"> • Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> • Improves quality of terrestrial habitat. • Maintains or improves agricultural practices which benefit terrestrial species. • Improves habitat of threatened and endangered species. • Improves wildlife corridors.
<ul style="list-style-type: none"> • Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> • Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> • Provides wet year spawning habitat for Delta smelt • Provides rearing areas for salmon • Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> • Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> • Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. • Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. • Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> • Increases spawning and rearing habitat for: <ul style="list-style-type: none"> • chinook salmon • Delta smelt • steelhead • splittail • striped bass • other native and non-native fish species • Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> • Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply reliability from the Sacramento River and its tributaries • Improves food supply availability for fish. • Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <p>Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to:</p> <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. <ul style="list-style-type: none"> • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> • Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • Floodway Corridors – Habitat restoration must not impair capacity of floodways. • Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. • Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> • Construct a new, 15,000 to 20,000 cfs dual screened diversion facility with multiple intakes on the Sacramento River upstream of the Delta for a portion of export supplies. • Construct a new 5,000 to 7,000 cfs eastside isolated conveyance facility to transport water around the Delta from the new diversion point to existing pumping plants in the south Delta. 	<ul style="list-style-type: none"> • Reduces entrainment effects of existing export facilities on fish. • Improves water quality for export users. • Offers the capability to provide water supplies to users in the region immediately east of the Delta, the Bay Area and exchange water on the San Joaquin River to boost instream flows. • Improves water supply reliability by adding flexibility of a second diversion point upstream of most Delta native fish habitat. • May reduce carriage water losses in critical years thereby benefitting water supply. • Creates a more efficient method of transporting water.
<ul style="list-style-type: none"> • Increase existing east-side channel flow capacity to facilitate transport of remaining water through the Delta, in conjunction with <i>Flood Protection and Levee Stabilization</i> actions. 	<ul style="list-style-type: none"> • Increases flow routing capability and flexibility. • May improve shaded riverine aquatic habitat along conveyance routes in conjunction with <i>habitat</i> actions.

Considerations

- Diversion would be constructed at a location upstream of the Delta such as near Hood or Freeport and sited to minimize intrusion into native fish habitat.
- Use best available screening technology on multiple intakes and real-time monitoring to minimize fisheries impacts.
- Locate screened diversions as far away from critical habitat as feasible.
- Siphons will carry isolated conveyance facilities beneath existing Delta channels to minimize environmental, water quality, and flood conveyance impacts.
- East-side channel improvements would focus on Mokelumne River but also include channels such as Cosumnes River and Deer Creek.
- The construction and improvement of an isolated conveyance facility would be done in conjunction with other actions intended to improve the transport of water among eastern Delta channels.
- The feasibility of using a buried aqueduct and multiple intakes will be investigated.
- A variation of this alternative will be investigated that would divert water upstream of Bryte and use the Yolo Bypass or Sacramento Ship Channel for conveyance to the planned isolated facility near Hood or Freeport.
- Potential to exchange water to increase San Joaquin River flows needs to be investigated.

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Construct new upstream storage with approximately 500,000 to 1 million AF capacity. Construct new downstream storage with approximately 500,000 to 1 million AF capacity. 	<ul style="list-style-type: none"> Provides additional storage and operational flexibility for supply, quality, and environmental needs. Allows diversions to be reduced during times of greater environmental sensitivity, and increased at times of reduced environmental sensitivity. Increases the opportunity for water transfers.
Considerations	
<ul style="list-style-type: none"> Environmentally dedicated water in upstream storage allows reduction in diversions during critical fishery periods. Upstream storage could be located in either Sacramento River or San Joaquin River basins. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> Block fish movement into Old River. Manage water flows and stages down Old River. 	<ul style="list-style-type: none"> Encourages outmigrating salmon to stay in San Joaquin River. Allows management of flows and stage in Old River. Improves water quality in the south Delta.
<ul style="list-style-type: none"> Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> Increases fish survival. Improves operational flexibility of facility.
<ul style="list-style-type: none"> Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> Improve fish screening capability at existing export diversion facilities. 	<ul style="list-style-type: none"> Reduces entrainment of fish at export facilities.
<ul style="list-style-type: none"> Construct a new screened State Water Project intake at Italian Slough. 	<ul style="list-style-type: none"> Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
<ul style="list-style-type: none"> Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> Increases fish survival.

Considerations

- Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility.
- New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake.

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. <ul style="list-style-type: none"> • For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. • To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta land use and infrastructure to inundation. • Reduces vulnerability of Delta water quality to salinity intrusion. • Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. • Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> • Improve flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements with a priority focus on the north Delta. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta functions to inundation. • Improves flood conveyance capacity in high priority channels. • Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> • Integrate protection and stabilization of levees with Delta habitat restoration and water transport activities. • Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts. • Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions and should be integrated with levee improvements. • Improvements to channels include dredging for sediment removal in channels with restricted flood capacity. • Evaluate combination of floodway capacity and reservoir flood reservation. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 300,000 to 400,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring lands which contribute to drainage problems along the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and extensive conjunctive use programs integrated with surface storage in the San Joaquin Valley and Tulare Lake Basin and in the Sacramento Valley. 	<ul style="list-style-type: none"> • Improves water supply reliability for the Bay-Delta system. • Increase drought year supplies. • Improve groundwater overdraft conditions,

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Investigate wholesale inclining block rates and water pricing structures for water users to encourage conservation activities. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Provides incentive for increased efficient use of water.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.

Activities	Benefits
<ul style="list-style-type: none"> Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> Improves flexibility of system operations. Increases water supply reliability.
Considerations	
<ul style="list-style-type: none"> Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality. Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers. Conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable. Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable. Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> Dilute pollutants in Delta inflows from San Joaquin River using 50,000 to 100,000 AF of stored water. 	<ul style="list-style-type: none"> Improves Delta water quality by providing a source of manageable dilution flows that can be released during low-flow/high drainage discharge periods.
<ul style="list-style-type: none"> Manage drainage timing (i.e. restrict drainage discharges by 40 to 50 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.

Activities	Benefits
<ul style="list-style-type: none"> Construct wetlands to treat 10,000 to 15,000 AF of upstream wastewater effluent and Delta agricultural drainage. 	<ul style="list-style-type: none"> Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> Increase enforcement of source control regulations for agricultural drainage to moderately: <ul style="list-style-type: none"> Reduce leachate concentrations and volumes. Restrict spray programs adjacent to waterways. Reduce runoff volumes. Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> Schedule deliveries in isolated conveyance facility and maximize drinking water quality to the end users. 	<ul style="list-style-type: none"> Improves export drinking water quality.
<ul style="list-style-type: none"> Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> Reduces future Delta and Sacramento River heavy metals loading.

Considerations

- Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries.
- Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc.
- Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements.
- Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution.
- Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately.
- Investigate scheduling of water in isolated facility to use high quality water stored south of the Delta as a blending supply during periods of low water quality in the Delta.

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> • Reduces fish losses. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> • Improve fish salvage procedures using best available technology. 	<ul style="list-style-type: none"> • Reduces fish take at the CVP/SWP pumping facility.
<ul style="list-style-type: none"> • Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.

Activities	Benefits
<ul style="list-style-type: none"> Expand permitted pumping capacity of the CVP and SWP south Delta facilities to their full physical capacity during windows when fish are less vulnerable to pumping effects (e.g. late Fall to early Winter). 	<ul style="list-style-type: none"> Increase operational flexibility of Delta exports. Reduce pumping effects on aquatic species of special concern. Improves ability to ensure water supply reliability and predictability. Increase yield both from the Delta and from upstream reservoirs due to reoperation practices and shifted Delta exports.
Considerations	
<ul style="list-style-type: none"> San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows. Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users. Increased pumping capacities at CVP/SWP south Delta facilities will be guided by real-time monitoring programs. Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> Conduct net-pen rearing of striped bass to supplant natural production. 	<ul style="list-style-type: none"> Maintains recreational fishery. Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. Need to assess impact of incidental mortality on native (unmarked) fish. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> Establish landside buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> Buffer zones provide an increase in stability of adjacent levees. Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> Establish and recommend moderate funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. Identify moderate funding sources for continuing levee maintenance activities beyond the planning horizon of this program. Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. Provides funding for continued maintenance of levees to protect Delta functions. Increases the reliability for water supply needs from the Delta.
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee improvements and buffer zone programs. Buffer zones may be managed to provide wildlife habitat. Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin. Emergency levee management program would not replace other levee maintenance or improvement programs. Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> Provides additional habitat restoration. Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements.
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.
<ul style="list-style-type: none"> Long-term planning for drought contingencies. <ul style="list-style-type: none"> Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> Improve drought response planning. Increases water supply reliability and predictability. Can be integrated with conjunctive use programs.

Activities	Benefits
<ul style="list-style-type: none"> Ease institutional barriers to facilitate water transfers. Improve planning and coordination procedures for water transfers. Improve operational procedures to facilitate water transfers. Establish a water brokering mechanism or institution. 	<ul style="list-style-type: none"> Increases the efficiency of implementing water transfers. Increases financial position of otherwise economically marginal projects which increase water supply flexibility. Increases water supply reliability, predictability, and flexibility.
<ul style="list-style-type: none"> Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> Develop incentives for local and regional coordination of land use and water supply planning. Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional planning and operation. 	<ul style="list-style-type: none"> Provides greater flexibility for short-term transfer water during drought contingencies. Increases the efficiency of water supply planning. Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none"> Determine institutional needs to implement long-term drought planning programs. Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Alternative D

Through Delta Conveyance

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,000 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt Provides rearing areas for salmon Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply reliability from the Sacramento River and its tributaries Improves food supply availability for fish. Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to: <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> • Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • Floodway Corridors – Habitat restoration must not impair capacity of floodways. • Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. • Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> Construct a new, 15,000 to 20,000 cfs screened diversion facility on the Sacramento River upstream of the Delta to divert all export supplies to eastside channels. 	<ul style="list-style-type: none"> Reduces entrainment effects of existing export facilities on fish. Offers the capability to provide water supplies to users in the region immediately east of the Delta. Improves water supply reliability by adding flexibility of a second diversion point upstream of most Delta native fish habitat. Creates a more efficient method of transferring water to export pumps. May reduce carriage water losses in critical years thereby benefitting water supply.
<ul style="list-style-type: none"> Increase existing east-side channel flow capacity to facilitate transport of water through the Delta, in conjunction with <i>Flood Protection and Levee Stabilization</i> actions. 	<ul style="list-style-type: none"> Increases flow routing capability and flexibility. May improve shaded riverine aquatic habitat along conveyance routes in conjunction with <i>habitat</i> actions.
Considerations	
<ul style="list-style-type: none"> Diversion would be constructed at a location upstream of the Delta such as near Hood or Freeport and sited to minimize intrusion into native fish habitat. Use best available screening technology on multiple intakes and real-time monitoring to minimize fisheries impacts. East-side channel improvements would focus on Mokelumne River but also include channels such as Cosumnes River and Deer Creek. An alternative formulation consisting of a screened diversion near Andrus Island and crossing the island to Georgiana Slough, then across Tyler Island to the Mokelumne River will be investigated. This formulation would include pumped releases at Georgiana Slough that would establish a hydraulic barrier to fish migration. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Construct new downstream storage with approximately 1 million to 1.5 million AF capacity Construct groundwater storage projects in the southern San Joaquin Valley with approximately 500,000 to 1 million AF annual supply. 	<ul style="list-style-type: none"> Provides additional storage and operational flexibility for supply, quality, and environmental needs Allows diversions to be reduced during times of greater environmental sensitivity, and increased at times of reduced environmental sensitivity

Considerations

- Groundwater storage may take the form of in-lieu recharge or direct recharge using injection wells or recharge basins.
- A portion of storage will be managed for in-Delta fisheries or other Bay-Delta environmental purposes.

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> • Block fish movement into Old River. • Manage water flows and stages down Old River. 	<ul style="list-style-type: none"> • Encourages outmigrating salmon to stay in San Joaquin River. • Allows management of flows and stage in Old River. • Improves water quality in the south Delta.
<ul style="list-style-type: none"> • Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> • Increases fish survival. • Improves operational flexibility of facility.
<ul style="list-style-type: none"> • Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> • Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> • Improve fish screening capability at existing export diversion facilities. 	<ul style="list-style-type: none"> • Reduces entrainment of fish at export facilities.
<ul style="list-style-type: none"> • Construct a new screened intake for the State Water Project at Italian Slough 	<ul style="list-style-type: none"> • Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
<ul style="list-style-type: none"> • Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> • Increases fish survival.
Considerations	
<ul style="list-style-type: none"> • Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. • New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. <ul style="list-style-type: none"> For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta land use and infrastructure to inundation. Reduces vulnerability of Delta water quality to salinity intrusion. Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> Improve flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta functions to inundation. Improves flood conveyance capacity in high priority channels. Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> Integrate protection and stabilization of levees with Delta habitat restoration activities. Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts. Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, should be integrated with levee improvements. Improvements to channels include dredging for sediment removal in channels with restricted flood capacity. Evaluate combination of floodway capacity and reservoir flood reservation. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. Permanently retire approximately 300,000 to 400,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> Reduced demand for Delta water exports. Could make water available for transfers. Provides water quality benefits in the San Joaquin River and south Delta by retiring lands that contribute to drainage problems along the San Joaquin River. Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> Expand groundwater banking and conjunctive use in Delta export areas such as the San Joaquin Valley and the Tulare Lake Basin to provide an annual yield of 300,000 to 500,000 AF and integrate with surface storage. 	<ul style="list-style-type: none"> Improves operational flexibility of Delta exports. Allows a portion of Delta exports to be shifted away from fish sensitive periods. Reduces fish entrainment at Delta pumping facilities.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.
<ul style="list-style-type: none"> • Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> • Improves flexibility of system operations. • Increases water supply reliability.

Considerations

- Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality.
- Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers.
- Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable.
- Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods.
- Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable.

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> • Reduces fish losses. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> • Improve fish salvage procedures using best available technology. 	<ul style="list-style-type: none"> • Reduces fish take at the CVP/SWP pumping facilities.
<ul style="list-style-type: none"> • Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.

Activities	Benefits
<ul style="list-style-type: none"> Expand permitted pumping capacity of the CVP and SWP south Delta facilities to their full physical capacity during windows when fish are less vulnerable to pumping effects (e.g., late Fall to early Winter). 	<ul style="list-style-type: none"> Increase operational flexibility of Delta exports. Reduce pumping effects on aquatic species of special concern. Improves ability to ensure water supply reliability and predictability. Increase yield both from the Delta and from upstream reservoirs due to reoperation practices and shifted Delta exports.
Considerations	
<ul style="list-style-type: none"> Increased pumping capacity at CVP/SWP south Delta facilities will be guided by real-time monitoring programs. <p>San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.</p> <ul style="list-style-type: none"> Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users. Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> Conduct net-pen rearing of striped bass for about 100,000 fish to supplant natural production. 	<ul style="list-style-type: none"> Maintains recreational fishery. Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Manage drainage timing (i.e. restrict drainage discharges by 20 to 30 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> • Construct wetlands to treat 10,000 to 15,000 AF of upstream wastewater effluent and Delta agricultural drainage. 	<ul style="list-style-type: none"> • Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> • Increase enforcement of source control regulations for agricultural drainage to moderately: <ul style="list-style-type: none"> • Reduce leachate concentrations and volumes. • Restrict spray programs adjacent to waterways. • Reduce runoff volumes. • Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> • Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> • Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> • Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> • Provide incentives for filtration system upgrades or watershed protection program development to improve source drinking water quality to meet EPA Drinking Water Quality Standards. Prioritize targeted recipients using criteria that includes, but is not limited to, number of service connections and upgrade costs needed to meet Maximum Contaminant Level Goals. 	<ul style="list-style-type: none"> • Improves source drinking water quality. • Directs funding to highest priority needs.

Activities	Benefits
<ul style="list-style-type: none"> Provide incentives for phased conversion of municipal treatment facilities from processes resulting in high disinfection byproduct precursor discharges to processes that do not produce DBP's. 	<ul style="list-style-type: none"> Reduces concentration of compounds contributing to trihalomethane formation potential and degradation to drinking water supplies.
<ul style="list-style-type: none"> Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> Reduces future Delta and Sacramento River heavy metals loading.
Considerations	
<ul style="list-style-type: none"> Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries. Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc. Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements. Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution. Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> Establish landside buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> Buffer zones provide an increase in stability of adjacent levees. Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.

Activities	Benefits
<ul style="list-style-type: none"> Establish and recommend modest funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. Identify funding sources for continuing levee maintenance activities beyond the planning horizon of this program. Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. Provides funding for continued maintenance of levees to protect Delta functions. Increases the reliability for water supply needs from the Delta.
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee improvements and buffer zone programs. Buffer zones may be managed to provide wildlife habitat. Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin. Emergency levee management program would not replace other levee maintenance or improvement programs. Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> Provides additional habitat restoration. Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.

Activities	Benefits
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.

Activities	Benefits
<ul style="list-style-type: none"> • Long-term planning for drought contingencies. <ul style="list-style-type: none"> • Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> • Improve drought response planning. • Increases water supply reliability. • Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> • Ease institutional barriers to facilitate water transfers. • Improve planning and coordination procedures for water transfers. • Improve operational procedures to facilitate water transfers. • Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> • Increases the efficiency of implementing water transfers. • Increases financial position of otherwise economically marginal projects that increase water supply flexibility. • Increases water supply reliability, predictability, and flexibility.
<ul style="list-style-type: none"> • Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> • Develop incentives for local and regional coordination of land use and water supply planning. • Implement long-term institutional measures to increase coordination of state/federal project planning and operations with local and regional project planning and operation. 	<ul style="list-style-type: none"> • Provides greater flexibility for short-term transfer water during drought contingencies. • Increases the efficiency of water supply planning. • Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none"> • Determine institutional needs to implement long-term drought planning programs. • Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. • Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	

Alternative E

Delta Channel Habitat and Conveyance

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 8,000 to 12,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (see <i>Flood Protection and Levee Stabilization</i>). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action alternatives. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,000 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt Provides rearing areas for salmon Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply reliability from the Sacramento River and its tributaries Improves food supply availability for fish. Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <p>Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to:</p> <ul style="list-style-type: none"> deepen channel, and improve water temperatures. <ul style="list-style-type: none"> Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply from the San Joaquin River and its tributaries. Improves (reduces) water temperature. Improves food supply availability for fish. Improves wildlife habitat. Provides more natural river corridor. Protects young fish from predation and straying.
<ul style="list-style-type: none"> Restoration of floodway corridor habitat Modify floodways to convert 5,000 to 7,000 acres of the production agricultural lands to wetland habitat. Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> Provides spawning areas for Delta native fish. Improves wildlife habitat. Improves forage areas and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. Floodway Corridors – Habitat restoration must not impair capacity of floodways. Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> Construct a new 15,000 to 20,000 cfs unscreened diversion on the Sacramento River upstream of the Delta to divert export supplies to eastside channel. 	<ul style="list-style-type: none"> Provide improved through Delta movement of water to maintain south Delta pumping operations. Improves water quality of the central and south Delta.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the conveyance capacity of 50 to 100 miles of channel through levee setbacks and shallow water benches, along Steamboat Slough, North and South Forks of the Mokelumne River, and along the San Joaquin River in conjunction with <i>Flood Protection and Levee Stabilization</i> actions. 	<ul style="list-style-type: none"> • Decrease water velocities of cross-Delta water movement. • Improves transport of migratory fish through the Delta. • In conjunction with <i>Habitat Restoration and Flood Protection and Levee Stabilizations</i> improves fish and wildlife habitat availability. • Increases water supply reliability and predictability.
Considerations <ul style="list-style-type: none"> • Diversion would be constructed at a location upstream of the Delta such as near Hood or Freeport and sited to minimize intrusion into native fish habitat. • Sculpt shallow water benches with mosaics of habitat such that velocities are greatly reduced. • The width of levee setbacks to successfully accomplish through-Delta flow improvements needs to be determine • If levee setbacks are inadequate, conversion of Delta islands into tidally influenced habitat will be considered. • A similar wide channel, low velocity conveyance system along Middle River in the south Delta will be investigated. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> • Block fish movement into Old River. • Manage water flows and stages down Old River. 	<ul style="list-style-type: none"> • Encourages outmigrating salmon to stay in San Joaquin River. • Allows management of flows and stage in Old River. • Improves water quality in the south Delta.
<ul style="list-style-type: none"> • Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> • Increase fish survival. • Improves operational flexibility of facility.
<ul style="list-style-type: none"> • Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> • Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> • Improve fish screening capability at existing export diversion facilities. 	<ul style="list-style-type: none"> • Reduces entrainment of fish at export facilities.

Activities	Benefits
<ul style="list-style-type: none"> Construct a new screened intake for the State Water Project at Italian Slough 	<ul style="list-style-type: none"> Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
<ul style="list-style-type: none"> Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> Increases fish survival.
Considerations	
<ul style="list-style-type: none"> Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. Low velocities in conveyance channels provide higher opportunities for fish to escape entrainment at the export pumping facilities. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. <ul style="list-style-type: none"> For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta land use and infrastructure to inundation. Reduces vulnerability of Delta water quality to salinity intrusion. Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> Improve flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta functions to inundation. Improves flood conveyance capacity in high priority channels. Provides greater opportunities for habitat restoration.

Considerations

- Integrate protection and stabilization activities with *Water Transport* and *Habitat Restoration* activities.
- Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts.
- Levee improvements should be integrated with channel improvements to improved conveyance in Steamboat Slough, North and South Forks of the Mokelumne River, and the San Joaquin River.
- Improvements to channels include dredging for sediment removal in channels with restricted flood capacity.
- Evaluate combination of floodway capacity and reservoir flood reservation.

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 300,000 to 400,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring marginally producing lands which contribute to drainage problems along the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and conjunctive use in Delta export areas such as the San Joaquin Valley and the Tulare Lake Basin to provide an annual yield of 300,000 to 500,000 A.F. 	<ul style="list-style-type: none"> • Improves operational flexibility of Delta exports. • Allows a portion of Delta exports to be shifted away from fish sensitive periods. • Reduces fish entrainment at Delta pumping facilities.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.
<ul style="list-style-type: none"> • Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> • Improves flexibility of system operations. • Increases water supply reliability.

Considerations

- Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality.
- Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers.
- Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable.
- Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods.
- Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable.

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> • Reduces fish losses. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> • Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.
<ul style="list-style-type: none"> • Expand permitted pumping capacity of the CVP and SWP south Delta facilities to their full physical capacity during windows when fish are less vulnerable to pumping effects (e.g., late fall to early winter). 	<ul style="list-style-type: none"> • Increases operational flexibility of Delta exports. • Reduces pumping effects on aquatic species of special concern. • Improves ability to ensure water supply reliability and predictability.

Considerations

- Increased pumping capacity at CVP/SWP south Delta facilities will be guided by real-time monitoring programs.
- San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.
- Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough.
- Evaluate behavioral barriers for Delta Cross Channel and Threemile Slough.
- Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users.

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> • Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> • Conduct net-pen rearing of striped bass about 100,000 fish to supplant natural production. 	<ul style="list-style-type: none"> • Maintains recreational fishery. • Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. • Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Manage drainage timing (i.e. restrict drainage discharges by 20 to 30 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.

Activities	Benefits
<ul style="list-style-type: none"> Construct wetlands to treat 10,000 to 15,000 AF of upstream wastewater effluent. 	<ul style="list-style-type: none"> Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> Increase enforcement of source control regulations for agricultural drainage to moderately: <ul style="list-style-type: none"> Reduce leachate concentrations and volumes. Restrict spray programs adjacent to waterways. Reduce runoff volumes. Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> Provide incentives for filtration system upgrades or watershed protection program development to improve source drinking water quality to meet EPA Drinking Water Quality Standards. Prioritize targeted recipients using criteria that includes, but is not limited to, number of service connections and upgrade costs needed to meet Maximum Contaminant Level Goals. 	<ul style="list-style-type: none"> Improves source drinking water quality. Directs funding to highest priority needs.
<ul style="list-style-type: none"> Provide incentives for phased conversion of municipal treatment facilities from processes resulting in high disinfection byproduct precursor discharges to processes that do not produce DBP's. 	<ul style="list-style-type: none"> Reduces concentration of compounds contributing to trihalomethane formation potential and degradation to drinking water supplies.
<ul style="list-style-type: none"> Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> Reduces future Delta and Sacramento River heavy metals loading.

Considerations

- Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries.
- Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc.
- Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements.
- Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution.
- Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately.

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> • Establish landside buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> • Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> • Establish and recommend modest funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. • Identify funding sources for continuing levee maintenance activities beyond the planning horizon of this program. • Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> • Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. • Provides funding for continued maintenance of levees to protect Delta functions. • Increases the reliability for water supply needs from the Delta.

Considerations

- Determine extent and cost effectiveness of levee improvements and buffer zone programs.
- Buffer zones may be managed to provide wildlife habitat.
- Candidate islands for subsidence include control, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin.
- Emergency levee management program would not replace other levee maintenance or improvement programs.
- Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997.

Institutional and Policy Features**Habitat Programs**

Activities	Benefits
<ul style="list-style-type: none"> • Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> • Provides additional habitat restoration. • Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> • Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> • Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
<ul style="list-style-type: none"> • Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> • Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> • Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> • Protects existing habitats. • Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> • Coordinate activities to avoid duplication. • CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.
<ul style="list-style-type: none"> Long-term planning for drought contingencies. <ul style="list-style-type: none"> Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> Improve drought response planning. Increases water supply reliability. Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> Ease institutional barriers to facilitate water transfers. Improve planning and coordination procedures for water transfers. Improve operational procedures to facilitate water transfers. Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> Increases the efficiency of implementing water transfers. Increases financial position of otherwise economically marginal development projects which increase water supply flexibility. Increases water supply reliability, predictability, and flexibility.

Activities	Benefits
<ul style="list-style-type: none">• Improve coordination of land use and water supply planning.<ul style="list-style-type: none">• Develop incentives for local and regional coordination of land use and water supply planning.• Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional project planning and operation.	<ul style="list-style-type: none">• Provides greater flexibility for short-term transfer water during drought contingencies.• Increases the efficiency of water supply planning.• Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none">• Determine institutional needs to implement long-term drought planning programs.• Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures.• Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows.	

Alternative F

Extensive Habitat Restoration with Storage

Note: See list of Core Actions for additional actions included in this alternative. Core Actions listed below are to be implemented at a higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> • Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> • Convert 8,000 to 12,000 acres of existing leveed lands to tidal actions. • Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> • Improves shallow water aquatic habitat. • Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other resident and anadromous fish
<ul style="list-style-type: none"> • Restore Delta riparian habitat. <ul style="list-style-type: none"> • Improve riparian conditions on 1,400 to 1,600 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. • Establish new areas of riparian habitat through acquisition of 4,000 to 5,000 acres of riparian land. • Improve riparian habitat through modified levee maintenance practices on an additional 10 to 15 percent of existing levees above the 15 to 25 percent of levees improved through Core Action activities. 	<ul style="list-style-type: none"> • Increases the availability of riparian habitat. • Improves the quality of riparian habitat within the Delta. • Increases availability of shade and cover habitats for aquatic species. • Provides spawning habitat for native and non-native fish. • Improves rearing habitat for salmon and other species.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 5,000 to 7,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 3,000 to 4,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 4,000 to 6,000 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt. Provides rearing areas for salmon. Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks).
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 100 to 125 miles of waterways. Reconstruct river banks and shallow water habitat on 100 to 150 miles of leveed banks along the Sacramento River. Protect and enhance 1,500 to 2,000 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore and enhance riparian vegetation on 25 to 75 miles of river upstream of the Delta between Verona and Colusa. • Relocate levees at appropriate locations between Verona and Colusa to restore Riverine habitat. • Establish 20 to 40 river miles of meander belts above Colusa. • Restore 6,000 to 7,000 acres of riparian habitat above Colusa above the 2,000 to 4,000 acres restored through Core Action activities. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply reliability from the Sacramento River and its tributaries. • Improves (reduces) water temperatures. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridors.
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. Restore channel configurations on 30 to 50 miles of degraded San Joaquin River to: <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 7,000 to 12,000 acres of agricultural production land into wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species

Considerations

- **Delta Habitat Restoration** – All types of habitat restoration activities will be focused in the North Delta due to continued reliance on south Delta exports.
- **Delta Shallow Water Habitat** – Candidate areas for restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta.
- **Delta Levee Habitat** – Candidate levees for restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River.
- **Floodway Corridors** – Habitat restoration must not impair capacity of floodways.
- **Suisun Bay** – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands.
- **San Joaquin River** – Feasible and cost-effective habitat restoration and channel modifications.
- **Riparian Habitat** – Coordinate with *Flood Protection and Levee Stabilization* actions.

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> • Convert one or more Delta islands to create new, environmentally dedicated, in-Delta storage with approximately 300,000 to 400,000 AF capacity with a new screened diversion facility to divert flows into storage. 	<ul style="list-style-type: none"> • Provides additional diversion flexibility. • Reduces entrainment of fish. • Reduces frequency and duration of export curtailments, thus improving water supply reliability. • Improves fish transport through Delta. • Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2. • Could provide added flexibility for water transfers.

Considerations

- Locate new environmentally dedicated Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria.
- Divert water into island storage during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and release water to move fish or release for diversion.
- Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits.

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> Block fish movement into Old River. Manage water flows and stages down Old River. 	<ul style="list-style-type: none"> Encourages outmigrating salmon to stay in San Joaquin River. Allows management of flows and stage in Old River. Improves water quality in the south Delta.
<ul style="list-style-type: none"> Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> Increases fish survival. Improves operational flexibility of facility.
<ul style="list-style-type: none"> Install fish screens on all priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> Improve fish screening capability at existing export diversion facilities. 	<ul style="list-style-type: none"> Reduces entrainment of fish at export facilities.
<ul style="list-style-type: none"> Construct a new screened intake for the State Water Project at Italian Slough. 	<ul style="list-style-type: none"> Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
<ul style="list-style-type: none"> Improve floodway drainage to reduce fish stranding by 50 percent. 	<ul style="list-style-type: none"> Increases fish survival.
Considerations	
<ul style="list-style-type: none"> Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. • For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. • To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta land use and infrastructure to inundation. • Reduces vulnerability of Delta water quality to salinity intrusion. • Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. • Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> • Increase flood conveyance capacity of Delta channels through channel maintenance actions (e.g. channel widening, setback levees, channel deepening, stabilizing berms, etc.) in conjunction with some levee upgrades and improvements. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta functions to inundation. • Improves flood conveyance capacity in critical flood channels. • Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> • Integrate protection and stabilization of levees with Delta habitat restoration activities. • Candidate areas for P.L.99 protection include, but are not limited to Sherman, Jersey, Bouldin, Mandeville, Lower Roberts, and Staten islands, and Canal Ranch, New Hope, Palm, Rindge, and Lower and Upper Jones tracts. • Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, and should be integrated with levee improvements. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 300,000 to 400,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring lands that contribute to drainage problems along the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and conjunctive use programs in the San Joaquin Valley, Tulare Lake Basin, and in the Sacramento Valley. 	<ul style="list-style-type: none"> • Improves operational flexibility of Delta exports. • Allows a portion of Delta exports to be shifted away from fish sensitive periods. • Reduces fish entrainment at Delta exports.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 100,000 to 200,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 100,000 to 200,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage for release when pulse flows can provide dilution..
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 100,000 to 200,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.
<ul style="list-style-type: none"> • Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> • Improves flexibility of system operations. • Increases water supply reliability.

Considerations

- Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality.
- Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers.
- Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable.
- Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods.
- Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable.

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> • Improve fish salvage procedures using best available technology. 	<ul style="list-style-type: none"> • Reduces fish take at the CVP/SWP pumping facilities.
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> • Reduces fish losses. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> • Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.

Considerations

- San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.
- Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users.

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> • Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> • Conduct net-pen rearing of striped bass for about 100,000 fish to supplant natural production. 	<ul style="list-style-type: none"> • Maintains recreational fishery. • Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Manage drainage timing (i.e. restrict drainage discharges by 20 to 30 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> • Construct wetlands to treat 10,000 to 15,000 AF of upstream wastewater effluent and Delta agricultural drainage. 	<ul style="list-style-type: none"> • Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.

Activities	Benefits
<ul style="list-style-type: none"> • Increase enforcement of source control regulations for agricultural drainage to extensively: <ul style="list-style-type: none"> • Reduce leachate concentrations and volumes. • Restrict spray programs adjacent to waterways. • Reduce runoff volumes. • Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> • Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> • Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> • Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> • Provide incentives for phased conversion of municipal treatment facilities from processes resulting in high disinfection byproduct precursor discharges to processes that do not produce DBP's. 	<ul style="list-style-type: none"> • Reduces concentration of compounds contributing to trihalomethane formation potential and degradation to drinking water supplies.
<ul style="list-style-type: none"> • Provide incentives for filtration system upgrades or watershed protection program development to improve source drinking water quality to meet EPA Drinking Water Quality Standards. Prioritize targeted recipients using criteria that includes, but is not limited to, number of service connections and upgrade costs needed to meet Maximum Contaminant Level Goals. 	<ul style="list-style-type: none"> • Improves source drinking water quality. • Directs funding to highest priority needs.
<ul style="list-style-type: none"> • Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> • Reduces future Delta and Sacramento River heavy metals loading.

Considerations

- Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries.
- Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc.
- Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements.
- Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution.
- Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately.

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> • Establish landside buffer zones adjacent to some levees on islands with deep peat soils. • Convert 8,000 to 12,000 acres of agricultural land on Delta islands below -10 feet of elevation to wetland habitat to implement a long-term subsidence management program. • On 15,000 to 20,000 acres of Delta islands between -10 and -3 feet of elevation, rotate seasonal wetlands with wildlife friendly agricultural practices to implement a long-term subsidence management program. 	<ul style="list-style-type: none"> • Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> • Establish and recommend modest funding for an emergency levee management program that provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. • Identify funding sources for continuing levee maintenance activities beyond the planning horizon of this program. • Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> • Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. • Provides funding for continued maintenance of levees to protect Delta functions. • Increases the reliability for water supply needs from the Delta.

Considerations

- Determine extent and cost effectiveness of levee improvements and buffer zone programs.
- Buffer zones may be managed to provide wildlife habitat.
- Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin.
- Emergency levee management program would not replace other levee maintenance or improvement programs.
- Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997.

Institutional and Policy Features**Habitat Programs**

Activities	Benefits
<ul style="list-style-type: none"> • Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> • Provides additional habitat restoration. • Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> • Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> • Accelerates acquisition of permits for environmental restoration projects and other CALFED projects

Activities	Benefits
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements.
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Long-term planning for drought contingencies. <ul style="list-style-type: none"> • Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> • Improve drought response planning. • Increases water supply reliability. • Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> • Ease institutional barriers to facilitate water transfers. • Improve planning and coordination procedures for water transfers. • Improve operational procedures to facilitate water transfers. • Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> • Increases the efficiency of implementing water transfers. • Increases financial position of otherwise economically marginal projects which increase water supply flexibility. • Increased water supply reliability, predictability, and flexibility.
<ul style="list-style-type: none"> • Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> • Develop incentives for local and regional coordination of land use and water supply planning. • Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional project planning and operation. 	<ul style="list-style-type: none"> • Provides greater flexibility for short-term transfer water during drought contingencies. • Increases the efficiency of water supply planning. • Ensures beneficial uses of existing water supplies.
<ul style="list-style-type: none"> • Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> • Reduces dry year demand for Delta water exports. • Could make water available for transfers.
Considerations <ul style="list-style-type: none"> • Determine institutional needs to implement long-term drought planning programs. • Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. • Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	

Alternative G

East-Side Foothills Conveyance

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,00 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt Provides rearing areas for salmon Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply reliability from the Sacramento River and its tributaries Improves food supply availability for fish. Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to: <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> • Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • Floodway Corridors – Habitat restoration must not impair capacity of floodways. • Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. • Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Convert one or more Delta islands to create new, environmentally dedicated, in-Delta storage with approximately 100,000 AF capacity with a new screened diversion facility to divert flows into storage. 	<ul style="list-style-type: none"> Provides additional diversion flexibility. Reduces entrainment of fish. Reduces frequency and duration of export curtailments, thus improving water supply reliability. Improves fish transport through Delta. Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2. Could provide added flexibility for water transfers.
Considerations	
<ul style="list-style-type: none"> Locate new environmentally dedicated Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria. Divert water into island storage during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and release water to move fish or release for diversion. Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits. 	

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> Construct new, 7,000 cfs combined capacity screened diversion facilities in stages on the Sacramento River (upstream of the Feather River confluence) and on the Feather River (upstream of the Sacramento River confluence) for a portion of export supplies. Construct a 5,000 to 7,000 cfs East Valley Conveyance Facility in stages along the eastern foothills from new diversions to the Merced River with an intertie constructed to the Delta Mendota Canal and California Aqueduct. Construct interconnections with eastside water users and between East Valley Conveyance facility and eastside projects such as Mokelumne Aqueduct, Hetch Hetchy, and New Melones. 	<ul style="list-style-type: none"> Reduces entrainment effects of existing export facilities on fish. Provides access to higher quality Sacramento River water for export users. Provides for water supply, groundwater recharge, groundwater banking, and instream flow enhancement. Allows for exchange of surface water from the Sacramento and Feather Rivers with water in eastside reservoirs to make water in reservoirs available for environmental purposes and for delivery to existing export facility. May reduce carriage water losses in critical years thereby benefitting water supply. Creates a more efficient method of transporting water. Offers the capability to provide water supplies to users in the region immediately east of the Delta, the Bay Area and exchange water on the San Joaquin River to boost instream flows.
Considerations	
<ul style="list-style-type: none"> Use best available screening technology and real-time monitoring to minimize fisheries impacts. Evaluate use of a temporary new diversion on the Sacramento River (near Hood or Freeport) to supply a portion of the East Valley Conveyance facility while completing diversion and conveyance facilities north of the Sacramento metropolitan area. The first stage of the East Valley Conveyance Facility would be constructed to the Tuolumne River with future stages extending to the Merced River and existing export canals. Locate screened diversion as far away from critical habitat as feasible. Parallel or investigate the use of the existing Folsom South Canal. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Develop improvements on Old River at the head of Old River to: <ul style="list-style-type: none"> • Block fish movement into Old River. • Manage water flows and stages down Old River. 	<ul style="list-style-type: none"> • Encourages outmigrating salmon to stay in San Joaquin River. • Allows management of flows and stage in Old River. • Improves water quality in the south Delta.
<ul style="list-style-type: none"> • Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> • Increases fish survival. • Improves operational flexibility of facility.
<ul style="list-style-type: none"> • Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> • Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> • Construct a new screened intake for the State Water Project at Italian Slough. 	<ul style="list-style-type: none"> • Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
<ul style="list-style-type: none"> • Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> • Increases fish survival.
Considerations	
<ul style="list-style-type: none"> • Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. • New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> Implement a comprehensive Delta Long-Term Protection Plan at a moderate level. <ul style="list-style-type: none"> For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard. To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta land use and infrastructure to inundation Reduces vulnerability of Delta water quality to salinity intrusion Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation Provides greater opportunities for habitat restoration
<ul style="list-style-type: none"> Improve flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta functions to inundation Improves flood conveyance capacity in high priority channels Provides greater opportunities for habitat restoration
Considerations	
<ul style="list-style-type: none"> Integrate protection and stabilization of levees with Delta habitat restoration activities. Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts. Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, should be integrated with levee improvements. Improvements to channels include dredging for sediment removal in channels with restricted flood capacity. Evaluate combination of floodway capacity and reservoir flood reservation. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 300,000 to 400,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring marginally producing lands that drain to the San Joaquin River. • Substantially reduces the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and conjunctive use programs in the San Joaquin Valley, Tulare Lake Basin, and the Sacramento Valley. 	<ul style="list-style-type: none"> • Improves operational flexibility of Delta exports. • Allows a portion of Delta exports to be shifted away from fish sensitive periods. • Reduces fish entrainment at Delta exports.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. <ul style="list-style-type: none"> • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. <ul style="list-style-type: none"> • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Investigate wholesale inclining block rates and water pricing structures for water users to encourage conservation activities. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Provides incentive for increased efficient use of water.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.

Activities	Benefits
<ul style="list-style-type: none"> Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> Improves flexibility of system operations. Increases water supply reliability.
Considerations	
<ul style="list-style-type: none"> Water transfers would be developed in conjunction with urban and industrial conservation, agricultural conservation, water pricing practices, and conjunctive use programs which develop new transferable supplies. Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality. Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers. Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable. Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods. Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable. 	

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> Transports fish through the San Joaquin River and Delta. Improves water quality. Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> Reduces fish losses. Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> Improve fish salvage procedures using best available technology. 	<ul style="list-style-type: none"> Reduces fish take at the CVP/SWP pumping facilities.

Activities	Benefits
<ul style="list-style-type: none"> Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> Provides an additional tool to help reduce entrainment of special-concern species. Improves flexibility to divert water during critical fish migration periods.
Considerations	
<ul style="list-style-type: none"> Can use San Joaquin environmental water for pulse flows for fish transport or diluting poor quality flows. Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> Conduct net-pen rearing of striped bass for about 100,000 fish to supplant natural production. 	<ul style="list-style-type: none"> Maintains recreational fishery. Reduces operational constraints on water diversions.
Considerations	
<ul style="list-style-type: none"> Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> Manage drainage timing (i.e. restrict drainage discharges by 40 to 50 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.

Activities	Benefits
<ul style="list-style-type: none"> Construct wetlands to treat 3,000 to 5,000 AF of upstream wastewater effluent. 	<ul style="list-style-type: none"> Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> Increase enforcement of source control regulations for agricultural drainage to moderately: <ul style="list-style-type: none"> Reduce leachate concentrations and volumes Restrict spray programs adjacent to waterways Reduce runoff volumes Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> Reduces future Delta and Sacramento River heavy metals loading.
<ul style="list-style-type: none"> Study and implement actions to reduce effects of salinity in the San Joaquin River, to maintain water levels and circulation in the south Delta, and to reduce recycled salt load to the San Joaquin Valley. 	<ul style="list-style-type: none"> Better manage flow circulation. Increase water stages for the south Delta. Improve San Joaquin River and south Delta water quality.

Considerations

- Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries.
- Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc.
- Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements.
- Potential benefits of south Delta stage, circulation, and water quality actions needs to be verified.
- Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution.
- Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately.

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> • Establish landside buffer zones adjacent to some levees on islands with deep peat soils 	<ul style="list-style-type: none"> • Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> • Establish and recommend moderate funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. • Identify moderate funding sources for continuing levee maintenance activities beyond the planning horizon of this program. • Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> • Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. • Provides funding for continued maintenance of levees to protect Delta functions. • Increases the reliability for water supply needs from the Delta.

Considerations

- Determine extent and cost effectiveness of levee improvements and buffer zone programs.
- Buffer zones may be managed to provide wildlife habitat.
- Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin.
- Emergency levee management program would not replace other levee maintenance or improvement programs.
- Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997.

Institutional and Policy Features**Habitat Programs**

Activities	Benefits
<ul style="list-style-type: none"> • Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> • Provides additional habitat restoration. • Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> • Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> • Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
<ul style="list-style-type: none"> • Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> • Provides materials for habitat and levee improvements.
<ul style="list-style-type: none"> • Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> • Protects existing habitats. • Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> • Coordinate activities to avoid duplication. • CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Protection

Activities	Benefits
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<ul style="list-style-type: none"> • Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> • Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> • Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> • Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> • Prioritize sources and pollutants of concern and direct enforcement activities accordingly. • Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Establish incentives for extensive amounts of long-term conjunctive use in the Sacramento and San Joaquin valleys (including San Joaquin County) and ease institutional barriers. 	<ul style="list-style-type: none"> • Reduces dry year demand for Delta water exports. • Could make water available for transfers.
<ul style="list-style-type: none"> • Long-term planning for drought contingencies. <ul style="list-style-type: none"> • Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> • Improve drought response planning. • Increases water supply reliability. • Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> • Ease institutional barriers to facilitate water transfers. • Improve planning and coordination procedures for water transfers. • Improve operational procedures to facilitate water transfers. • Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> • Increases the efficiency of implementing water transfers. • Increases financial position of otherwise economically marginal development projects which increase water supply predictability. • Increases water supply reliability, predictability, and flexibility.

Activities	Benefits
<ul style="list-style-type: none">• Improve coordination of land use and water supply planning.<ul style="list-style-type: none">• Develop incentives for local and regional coordination of land use and water supply planning.• Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional project planning and regional planning.	<ul style="list-style-type: none">• Provides greater flexibility for short-term transfer water during drought contingencies.• Increases the efficiency of water supply planning.• Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none">• Determine institutional needs to implement long-term drought planning programs.• Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures.• Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows.	

Alternative H

Chain of Lakes Conveyance

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,000 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt Provides rearing areas for salmon Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply reliability from the Sacramento River and its tributaries Improves food supply availability for fish. Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <p>Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to:</p> <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. <ul style="list-style-type: none"> • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> • Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • Floodway Corridors – Habitat restoration must not impair capacity of floodways. • Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. • Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> Convert selected Delta islands into an interconnected storage and conveyance system extending from northern diversion, located on the Sacramento River (near Hood or Freeport) to the existing export facilities in the south Delta. Construct multiple new, 5,000 cfs screened diversions at various points within the Delta between the existing south Delta facilities and the Sacramento River to divert into the interconnected storage and conveyance system. 	<ul style="list-style-type: none"> Multiple diversion points reduces entrainment of fish and provides operational flexibility. In-Delta storage within converted islands allows diversions to be curtailed during periods of high environmental sensitivity. Improves export water quality. May reduce carriage water losses in critical years thereby benefitting water supply. Creates a more efficient method of transporting water.
Considerations	
<ul style="list-style-type: none"> Islands converted to storage/conveyance facility would be connected using inverted siphons under intervening channels to minimize environmental, water quality, and flood conveyance impacts. Potential water savings from isolated diversions may provide additional water to beneficial uses. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Construct converted Delta islands into in-Delta storage with 300,000 to 600,000 AF capacity. 	<ul style="list-style-type: none"> Provides additional storage and operational flexibility for supply, quality, and environmental needs. Allows diversions to be reduced during times of greater environmental sensitivity, and increased at times of reduces environmental sensitivity. Reduces frequency and duration of export curtailments, thus improving water supply reliability. Improves through Delta transport of fish.

Considerations

- Divert water into island storage during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and release water to move fish or release for diversion.
- Evaluate the need to remove or seal organic soils on reservoir islands to avoid release of carbon into stored water, adversely impacting water quality.
- Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits.
- Environmentally dedicated water in upstream storage allows reductions in diversions during critical fishery periods.
- Foundation and slope stability considerations may limit the daily drawdown of in-Delta storage, requiring higher amounts of storage.

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> • Increases fish survival. • Improves operational flexibility of facility.
<ul style="list-style-type: none"> • Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> • Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> • Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> • Increases fish survival.
Considerations	
<ul style="list-style-type: none"> • Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. • New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> Implement a comprehensive Delta Long-Term Protection Plan at a modest level in addition to levee upgrades required for conversion of islands into a chain of lakes. For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 200 to 250 miles of levees currently below the HMP standard. To implement levee improvements and associated habitat improvements along 60 to 90 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta land use and infrastructure to inundation. Reduces vulnerability of Delta water quality to salinity intrusion. Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> Increase flood conveyance capacity of Delta channels through channel maintenance actions (e.g. channel widening, setback levees, channel deepening, stabilizing berms, etc.) in conjunction with some levee upgrades and improvements. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta functions to inundation. Improves flood conveyance capacity in critical flood channels. Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> Integrate protection and stabilization of levees with Delta habitat restoration activities. Candidate areas for P.L.99 protection include, but are not limited to Sherman, Jersey, Bouldin, Mandeville, Lower Roberts, and Staten islands, and Canal Ranch, New Hope, Palm, Rindge, and Lower and Upper Jones tracts. Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, and should be integrated with levee improvements. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. Permanently retire approximately 70,000 to 100,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> Reduced demand for Delta water exports. Could make water available for transfers. Provides water quality benefits in the San Joaquin River and south Delta by retiring lands that contribute to drainage problems along the San Joaquin River. Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> Expand groundwater banking and conjunctive use programs in the San Joaquin Valley, Tulare Lake Basin, and in the Sacramento Valley. 	<ul style="list-style-type: none"> Improves operational flexibility of Delta exports. Increase water supply reliability and predictability. Reduces groundwater overdraft problems in the San Joaquin Valley and Tulare Lake Basin.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution. Investigate wholesale inclining block rates and water pricing structures for water users to encourage conservation activities.
<ul style="list-style-type: none"> • Investigate wholesale inclining block rates and water pricing structures for water users to encourage conservation activities. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Provides incentive for increased efficient use of water.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.

Activities	Benefits
<ul style="list-style-type: none"> Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> Improves flexibility of system operations. Increases water supply reliability.
Considerations	
<ul style="list-style-type: none"> Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality. Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers. Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable. Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods. Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable. 	

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> Transports fish through the San Joaquin River and Delta. Improves water quality. Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> Reduces fish losses. Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> Provides an additional tool to help reduce entrainment of special-concern species. Improves flexibility to divert water during critical fish migration periods.

Considerations

- San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.
- Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users.
- Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows.

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> • Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
Considerations	
<ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Dilute pollutants in Delta inflows from San Joaquin River using 50,000 to 100,000 AF of stored water. 	<ul style="list-style-type: none"> • Improves Delta water quality by providing a source of manageable dilution flows that can be released during low-flow/high drainage discharge periods.
<ul style="list-style-type: none"> • Manage drainage timing (i.e. restrict drainage discharges by 40 to 50 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> • Construct wetlands to treat 3,000 to 5,000 AF of upstream wastewater effluent. 	<ul style="list-style-type: none"> • Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.

Activities	Benefits
<ul style="list-style-type: none"> • Increase enforcement of source control regulations for agricultural drainage to extensively: <ul style="list-style-type: none"> • Reduce leachate concentrations and volumes. • Restrict spray programs adjacent to waterways. • Reduce runoff volumes. • Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> • Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> • Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> • Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> • Implement extensive on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> • Reduces future Delta and Sacramento River heavy metals loading.
Considerations	
<ul style="list-style-type: none"> • Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries. • Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc. • Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements. • Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution. • Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> Establish landside buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> Buffer zones provide an increase in stability of adjacent levees. Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> Establish and recommend extensive funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. Identify extensive funding sources for continuing levee maintenance activities beyond the planning horizon of this program. Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. Provides funding for continued maintenance of levees to protect Delta functions. Increases the reliability for water supply needs from the Delta.
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee improvements and buffer zone programs. Buffer zones may be managed to provide wildlife habitat. Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin. Emergency levee management program would not replace other levee maintenance or improvement programs. Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other federal and state programs, 	<ul style="list-style-type: none"> Provides additional habitat restoration. Provides coordination between

Activities	Benefits
<ul style="list-style-type: none"> Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from CALFED member agencies. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.
<ul style="list-style-type: none"> Long-term planning for drought contingencies. <ul style="list-style-type: none"> Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> Improve drought response planning. Increases water supply reliability. Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> Ease institutional barriers to facilitate water transfers. Improve planning and coordination procedures for water transfers. Improve operational procedures to facilitate water transfers. Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> Increases the efficiency of implementing water transfers. Increases financial position of otherwise economically marginal projects that increase water supply flexibility. Increase water supply reliability, predictability, and flexibility.
<ul style="list-style-type: none"> Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> Develop incentives for local and regional coordination of land use and water supply planning. Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional project planning and operation. 	<ul style="list-style-type: none"> Provides greater flexibility for short-term transfer water during drought contingencies. Increases the efficiency of water supply planning. Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none"> Determine institutional needs to implement long-term drought planning programs. Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	

Alternative I

West-Side Conveyance and River Restoration

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions. Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> Improves shallow water aquatic habitat. Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> juvenile salmon Delta smelt splittail and longfin smelt other resident and anadromous fish
<ul style="list-style-type: none"> Restore Delta riparian habitat. <ul style="list-style-type: none"> Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land. 	<ul style="list-style-type: none"> Increases the availability of riparian habitat. Improves the quality of riparian habitat within the Delta. Increases availability of shade and cover habitats for aquatic species. Provides spawning habitat for native and non-native fish. Improves rearing habitat for salmon and other species.
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 3,000 to 5,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 1,500 to 2,500 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt Provides rearing areas for salmon Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways. Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River. Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.
<ul style="list-style-type: none"> Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa. Establish 20 to 40 river miles of meander belts above Colusa. 	<ul style="list-style-type: none"> Increases natural fish productivity. Improves water quality and water supply reliability from the Sacramento River and its tributaries Improves food supply availability for fish. Improves wildlife habitat.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to: <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species
Considerations	
<ul style="list-style-type: none"> • Delta Shallow Water Habitat – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • Delta Levee Habitat – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • Floodway Corridors – Habitat restoration must not impair capacity of floodways. • Suisun Bay – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • San Joaquin River – Feasible and cost-effective habitat restoration and channel modifications. • Riparian Habitat – Coordinate with <i>Flood Protection and Levee Stabilization</i> actions. 	

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> Construct a new, 2,000 to 7,000 cfs screened diversion facility on the Feather River system located at the Thermalito Afterbay to divert wet weather water and a conveyance facility to transport water from the new diversion to new offstream storage on the west-side of the Sacramento Valley. Construct a new, 5,000 to 10,000 cfs screened diversion facility on the Sacramento River system located at Shasta Lake and a new conveyance facility to transport water from the new diversion to new offstream storage on the west side of the Sacramento Valley. Remove GCID and Tehama Colusa diversions from river and connect users to new conveyance storage facility. 	<ul style="list-style-type: none"> Anadromous fish are not exposed to major diversion thereby reducing entrainment during export diversion. Improves water quality because the diversion is above major pollution sources. Ability to capture significant wet weather flows that would otherwise have to be released and transport them to storage.
<ul style="list-style-type: none"> Construct a new, 10,000 to 15,000 cfs west-side conveyance facility to transport water from the new offstream west-side storage point around the Delta to existing pumping plants in the south Delta. 	<ul style="list-style-type: none"> Improves water quality for export users. Offers the capability to provide water supplies to users on the North Bay Aqueduct, Contra Costa Canal, the Mokelumne Aqueduct, and the South Bay Aqueducts as well as to CVP and SWP export pumps. Improves water supply reliability by adding flexibility of a second diversion point upstream of most Delta native fish habitat. May reduce carriage water losses in critical years thereby benefitting water supply. Creates a more efficient method of transporting water.
Considerations	
<ul style="list-style-type: none"> Divert only during flood flows to minimize fisheries impacts. Siphons and canals will transport water across Delta to minimize environmental, water quality, and flood conveyance impacts. Provide turnouts from west-side Delta isolated conveyance facilities to stream flow augmentation points and to groundwater and conjunctive use areas on the west and east sides of the Sacramento Valley. Investigate the temporary use of the Red Bluff Diversion Dam and the Tehama Colusa Canal to convey water to West-side storage while constructing conveyance directly from Shasta Dam. A variation of this alternative will be investigated that would divert water upstream of the Sacramento Weir and use the Sacramento Ship Channel or Yolo Bypass to convey water to a southern terminus where siphons and additional canals will transport water to the existing export facilities in the south Delta. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> Construct about 6 to 8 million AF of offstream storage on west-side of Sacramento Valley to store captured wet weather water. 	<ul style="list-style-type: none"> Adds new source of water supply for all beneficial users. Provides additional storage and operational flexibility.
Considerations	
<ul style="list-style-type: none"> Construct new offstream storage at locations such as Colusa-Sites Reservoir site or enlarge existing Berryessa Reservoir. Divert water into new storage facility during November, December, and January; release water from March to July as needed. Environmentally dedicated water in upstream storage allows reduction in diversions during critical fishery periods. Locate screened diversions as far away from critical habitat as feasible. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> Increases fish survival. Improves operational flexibility of facility.
<ul style="list-style-type: none"> Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> Improve floodway drainage to reduce fish stranding by 30 percent. 	<ul style="list-style-type: none"> Increases fish survival.
Considerations	
<ul style="list-style-type: none"> Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> Implement a comprehensive Delta Long-Term Protection Plan at a modest level. <ul style="list-style-type: none"> For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 200 to 250 miles of levees currently below the HMP standard. To implement levee improvements and associated habitat improvements along 60 to 90 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta land use and infrastructure to inundation. Reduces vulnerability of Delta water quality to salinity intrusion. Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> Improve flood conveyance capacity of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements. 	<ul style="list-style-type: none"> Reduces vulnerability of Delta functions to inundation. Improves flood conveyance capacity in high priority channels. Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> Integrate protection and stabilization of levees with Delta habitat restoration activities. Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts. Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, should be integrated with levee improvements. Improvements to channels include dredging for sediment removal in channels with restricted flood capacity. Evaluate combination of floodway capacity and reservoir flood reservation. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 70,000 to 100,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for drought-year transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring marginally producing lands that drain to the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and extensive conjunctive use programs in the San Joaquin and Tulare Lake Basin integrated with surface storage. 	<ul style="list-style-type: none"> • Improves water supply reliability during drought conditions. • Reduces groundwater over-draft conditions in the San Joaquin Valley and Tulare Lake Basin.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for drought year transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Investigate wholesale inclining block rates and water pricing structures for water users to encourage conservation activities. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Provides incentive for increased efficient use of water.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 100,000 to 200,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage and use for salinity intrusion. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for drought-year transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.

Activities	Benefits
<ul style="list-style-type: none"> Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> Improves flexibility of system operations. Increases water supply reliability.
Considerations	
<ul style="list-style-type: none"> Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality. Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers. Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable. Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods. Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable. 	

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> Transports fish through the San Joaquin River and Delta. Improves water quality. Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> Reduces fish losses. Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> Provides an additional tool to help reduce entrainment of special-concern species. Improves flexibility to divert water during critical fish migration periods.

Considerations

- San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.
- Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users.
- Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows.

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> • Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
Considerations	
<ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> • Manage drainage timing (i.e. restrict drainage discharges by 40 to 50 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> • Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> • Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> • Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> • Construct wetlands to treat 3,000 to 5,000 AF of upstream wastewater effluent. 	<ul style="list-style-type: none"> • Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.

Activities	Benefits
<ul style="list-style-type: none"> • Increase enforcement of source control regulations for agricultural drainage to moderately: <ul style="list-style-type: none"> • Reduce leachate concentrations and volumes. • Restrict spray programs adjacent to waterways. • Reduce runoff volumes. • Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> • Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> • Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> • Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> • Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> • Implement modest on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> • Reduces future Delta and Sacramento River heavy metals loading.
<ul style="list-style-type: none"> • Study and implement actions to reduce effects of salinity in the San Joaquin River, to maintain water levels and circulation in the south Delta, and to reduce recycled salt load to the San Joaquin Valley. 	<ul style="list-style-type: none"> • Better manage flow circulation. • Increase water stages for the south Delta. • Improve San Joaquin River and south Delta water quality.

Considerations

- Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries.
- Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc.
- Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements.
- Potential benefits of south Delta stage, circulation, and water quality actions need to be verified.
- Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution.
- Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately.

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> • Establish landside buffer zones adjacent to some levees on islands with deep peat soils. 	<ul style="list-style-type: none"> • Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
<ul style="list-style-type: none"> • Establish and recommend extensive funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. • Identify extensive funding sources for continuing levee maintenance activities beyond the planing horizon of this program. • Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> • Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. • Provides funding for continued maintenance of levees to protect Delta functions. • Increases the reliability for water supply needs from the Delta.

Considerations

- Determine extent and cost effectiveness of levee improvements and buffer zone programs.
- Buffer zones may be managed to provide wildlife habitat.
- Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin.
- Emergency levee management program would not replace other levee maintenance or improvement programs.
- Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997.

Institutional and Policy Features**Habitat Programs**

Activities	Benefits
<ul style="list-style-type: none"> • Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> • Provides additional habitat restoration. • Provides coordination between habitat restoration programs.
<ul style="list-style-type: none"> • Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> • Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
<ul style="list-style-type: none"> • Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> • Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> • Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> • Protects existing habitats. • Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> • Coordinate activities to avoid duplication. • CALFED Regulatory Team would be comprised of key personnel from CALFED member agencies. 	

Water Quality Protection

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
Activities	Benefits
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.
<ul style="list-style-type: none"> Long-term planning for drought contingencies. Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> Improve drought response planning. Increases water supply reliability. Can be integrated with conjunctive use programs.
<ul style="list-style-type: none"> Ease institutional barriers to facilitate water transfers. Improve planning and coordination procedures for water transfers. Improve operational procedures to facilitate water transfers. Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> Increases the efficiency of implementing water transfers. Increases financial position of otherwise economically marginal projects that increase water supply flexibility. Increase water supply reliability, predictability, and flexibility.

Activities	Benefits
<ul style="list-style-type: none">• Improve coordination of land use and water supply planning.<ul style="list-style-type: none">• Develop incentives for local and regional coordination of land use and water supply planning.• Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional project planning and operation.	<ul style="list-style-type: none">• Provides greater flexibility for short-term transfer water during drought contingencies.• Increases the efficiency of water supply planning.• Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none">• Determine institutional needs to implement long-term drought planning programs.• Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures.• Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows.	

Alternative J

East-Side Conveyance

Note: See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.

Physical and Structural Features**Habitat Restoration**

Activities	Benefits
<ul style="list-style-type: none"> • Restore shallow water (tidal) habitat in the Delta. <ul style="list-style-type: none"> • Convert 8,000 to 12,000 acres of existing leveed lands to tidal actions. • Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with <i>Flood Protection and Levee Stabilization</i> activities). 	<ul style="list-style-type: none"> • Improves shallow water aquatic habitat. • Increases the availability of forage, spawning, and rearing habitats and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other resident and anadromous fish
<ul style="list-style-type: none"> • Restore Delta riparian habitat. <ul style="list-style-type: none"> • Improve riparian conditions on 1,400 to 1,600 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities. • Establish new areas of riparian habitat through acquisition of 4,000 to 5,000 acres of riparian land. • Improve riparian habitat through modified levee maintenance practices on an additional 10 to 15 percent of existing levees above the 15 to 25 percent of levees improved through Core Action activities. 	<ul style="list-style-type: none"> • Increases the availability of riparian habitat. • Improves the quality of riparian habitat within the Delta. • Increases availability of shade and cover habitats for aquatic species. • Provides spawning habitat for native and non-native fish. • Improves rearing habitat for salmon and other species.

Activities	Benefits
<ul style="list-style-type: none"> Restoration of Delta (non-tidal) wetland habitat. <ul style="list-style-type: none"> Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities. Convert 5,000 to 7,000 acres of suitable lands to wetland habitats. 	<ul style="list-style-type: none"> Increases the availability of waterfowl and wildlife rearing habitats. Provides long-term increases in stability of Delta levees and reliability of Delta functions.
<ul style="list-style-type: none"> Restoration of Delta Terrestrial Habitat. <ul style="list-style-type: none"> Protect and enhance 3,000 to 4,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Improves quality of terrestrial habitat. Maintains or improves agricultural practices which benefit terrestrial species. Improves habitat of threatened and endangered species. Improves wildlife corridors.
<ul style="list-style-type: none"> Restoration of Suisun Bay habitat. <ul style="list-style-type: none"> Restore 4,000 to 6,000 acres to tidal wetland habitat. 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt. Provides rearing areas for salmon. Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks).
<ul style="list-style-type: none"> Restore riverine habitat on the Sacramento River between Verona and Collinsville and along Delta channels. <ul style="list-style-type: none"> Set back levees to restore natural riverine cross sections to 100 to 125 miles of waterways. Reconstruct river banks and shallow water habitat on 100 to 150 miles of leveed banks along the Sacramento River. Protect and enhance 1,500 to 2,000 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities. 	<ul style="list-style-type: none"> Increases spawning and rearing habitat for: <ul style="list-style-type: none"> chinook salmon Delta smelt steelhead splittail striped bass other native and non-native fish species Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.

Activities	Benefits
<ul style="list-style-type: none"> • Restore riverine channel features in the Sacramento River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore and enhance riparian vegetation on 25 to 75 miles of river upstream of the Delta between Verona and Colusa. • Relocate levees at appropriate locations between Verona and Colusa to restore riverine habitat. • Establish 20 to 40 river miles of meander belts above Colusa. • Restore 6,000 to 7,000 acres of riparian habitat above Colusa above the 2,000 to 4,000 acres restored through Core Action activities. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply reliability from the Sacramento River and its tributaries. • Improves (reduces) water temperatures. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridors.
<ul style="list-style-type: none"> • Restore riverine channel features in the San Joaquin River upstream of the Delta, including tributaries. <ul style="list-style-type: none"> • Restore channel configurations on 30 to 50 miles of degraded San Joaquin River to: <ul style="list-style-type: none"> • deepen channel, and • improve water temperatures. • Isolate in-channel gravel quarry areas from main flows of the San Joaquin River and its tributaries. 	<ul style="list-style-type: none"> • Increases natural fish productivity. • Improves water quality and water supply from the San Joaquin River and its tributaries. • Improves (reduces) water temperature. • Improves food supply availability for fish. • Improves wildlife habitat. • Provides more natural river corridor. • Protects young fish from predation and straying.
<ul style="list-style-type: none"> • Restoration of floodway corridor habitat <ul style="list-style-type: none"> • Modify floodways to convert 7,000 to 12,000 acres of agricultural production land into wetland habitat. • Reduce fish stranding in accordance with <i>Fish Protection and Transport</i> actions. 	<ul style="list-style-type: none"> • Provides spawning areas for Delta native fish. • Improves wildlife habitat. • Improves forage areas and escape cover for: <ul style="list-style-type: none"> • juvenile salmon • Delta smelt • splittail • other native and non-native fish species

Considerations

- **Delta Habitat Restoration** – All types of habitat restoration activities will be focused in the North Delta due to continued reliance on south Delta exports.
- **Delta Shallow Water Habitat** – Candidate areas for restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta.
- **Delta Levee Habitat** – Candidate levees for restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River.
- **Floodway Corridors** – Habitat restoration must not impair capacity of floodways.
- **Suisun Bay** – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands.
- **San Joaquin River** – Feasible and cost-effective habitat restoration and channel modifications.
- **Riparian Habitat** – Coordinate with *Flood Protection and Levee Stabilization* actions.

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> • Construct a new, 15,000 to 20,000 cfs screened diversion facility with multiple intakes on the Sacramento River upstream of the Delta for all export supplies. • Construct a new 15,000 to 20,000 cfs eastside isolated conveyance facility to transport water around the Delta from the new diversion point to existing pumping plants in the south Delta. 	<ul style="list-style-type: none"> • Reduces entrainment effects of existing export facilities on fish during diversion. • Improves water quality for export users. • Offers the capability to provide water supplies to users in the region immediately east of the Delta. • Improves water supply reliability. • May reduce carriage water losses in critical years thereby benefitting water supply. • Creates a more efficient method of transferring water.

Considerations

- Site diversions and conveyance facility to provide supplemental supplies to EBMUD, San Joaquin County, South Sacramento County, Contra Costa County, and exchange water for the San Joaquin River.
- Diversion at a location upstream of the Delta such as near Hood or Freeport, sited to minimize intrusion into native fish habitat.
- Use best available screening technology and real-time monitoring to minimize fisheries impacts.
- Siphons will carry isolated conveyance facility beneath existing Delta channels to avoid environmental, water quality, and flood conveyance impacts.
- Investigate the feasibility of multiple smaller diversion sites to improve operational flexibility and the ability to respond to fishery concerns.
- Operation of barriers coordinated with in-Delta and anadromous fishery needs through real-time monitoring.
- Potential benefits of barriers need to be verified.

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Continue to evaluate acoustic barrier at Delta Cross Channel to block outmigrating fish from entering the interior Delta. 	<ul style="list-style-type: none"> • Increases fish survival. • Improves operational flexibility of facility.
<ul style="list-style-type: none"> • Install fish screens on all priority diversions in the Delta, rivers, and tributaries. 	<ul style="list-style-type: none"> • Reduces entrainment of fish throughout the system.
<ul style="list-style-type: none"> • Improve floodway drainage to reduce fish stranding by 50 percent. 	<ul style="list-style-type: none"> • Increases fish survival.
Considerations	
<ul style="list-style-type: none"> • Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. • New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Implement a comprehensive Delta Long-Term Protection Plan at a modest level. <ul style="list-style-type: none"> • For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 200 to 250 miles of levees currently below the HMP standard. • To implement levee improvements and associated habitat improvements along 60 to 90 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta land use and infrastructure to inundation. • Reduces vulnerability of Delta water quality to salinity intrusion. • Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation. • Provides greater opportunities for habitat restoration.
<ul style="list-style-type: none"> • Increase flood conveyance capacity of Delta channels through channel maintenance actions (e.g. channel widening, setback levees, channel deepening, stabilizing berms, etc.) in conjunction with some levee upgrades and improvements. 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta functions to inundation. • Improves flood conveyance capacity in critical flood channels. • Provides greater opportunities for habitat restoration.
Considerations	
<ul style="list-style-type: none"> • Integrate protection and stabilization of levees with Delta habitat restoration activities. • Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, Mandeville, Lower Roberts, and Staten islands, and Canal Ranch, New Hope, Palm, Rindge, and Lower and Upper Jones tracts. • Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, and should be integrated with levee improvements. 	

Operational and Management Features

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> • Encourage temporary land fallowing during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently retire approximately 70,000 to 100,000 acres of marginally producing agricultural lands and lands from willing sellers through use of incentives and land purchases. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring marginally producing lands that drain to the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
<ul style="list-style-type: none"> • Expand groundwater banking and conjunctive use programs in the San Joaquin Valley, Tulare Lake Basin, and in the Sacramento Valley. 	<ul style="list-style-type: none"> • Improves water supply reliability during drought conditions. • Reduces groundwater overdraft conditions in the San Joaquin Valley and Tulare Lake Basin.

Activities	Benefits
<ul style="list-style-type: none"> • Increase the implementation of municipal and industrial water conservation to reduce demand by 200,000 to 300,000 AF over current implementation commitments. • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users. • Expand the BMP's to include additional practices and higher implementation rates. • Increase the level of agricultural water conservation to reduce demand by an additional 200,000 to 400,000 AF. • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users. • Expand the EWMP's to include additional practices. 	<ul style="list-style-type: none"> • Reduces overall water demand. • Could make water available for transfers. • May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.
<ul style="list-style-type: none"> • Investigate wholesale inclining block rates and water pricing structures for water users to encourage conservation activities. 	<ul style="list-style-type: none"> • Reduced demand for Delta water exports. • Provides incentive for increased efficient use of water.
<ul style="list-style-type: none"> • Implement urban wastewater reclamation programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and recycle agricultural drainage for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements. 	<ul style="list-style-type: none"> • Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.

Activities	Benefits
<ul style="list-style-type: none"> Develop an incentive driven program to modify upstream reservoir releases on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs. 	<ul style="list-style-type: none"> Improves flexibility of system operations. Increases water supply reliability.
Considerations	
<ul style="list-style-type: none"> Emphasis for land retirement will be placed on land which contributes to regional drainage problems. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality. Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers. Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable. Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water. Conjunctive use and groundwater storage programs can include in-lieu operations with high deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> Dilute pollutants in Delta inflows from San Joaquin river using 50,000 to 100,000 AF of stored water. 	<ul style="list-style-type: none"> Improves Delta water quality by providing a source of manageable dilution flows that can be released during low-flow/high drainage discharge periods.
<ul style="list-style-type: none"> Manage drainage timing (i.e. restrict drainage discharges by 60 to 70 percent during periods of low Delta inflow) to reduce instream impacts to water quality. 	<ul style="list-style-type: none"> Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
<ul style="list-style-type: none"> Treat 20 to 30 percent of agricultural drainage to remove pollutants, to either be reused or used as part of a localized drainage management practice in coordination with the management of drainage timing, to reduce impacts to water quality. 	<ul style="list-style-type: none"> Provides additional dilution flows for improving the quality of receiving waters in-Delta and to Delta tributaries.

Activities	Benefits
<ul style="list-style-type: none"> Improve management of urban stormwater runoff to retain an additional 20 to 30 percent of runoff volume contained presently. 	<ul style="list-style-type: none"> Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
<ul style="list-style-type: none"> Construct wetlands to treat 3,000 to 5,000 AF of upstream wastewater effluent. 	<ul style="list-style-type: none"> Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.
<ul style="list-style-type: none"> Modify, or shift the timing of diversions so that relatively higher volumes of water are diverted during periods of low salinity if possible given storage and operational constraints. 	<ul style="list-style-type: none"> Improves Delta and tributary water quality by increasing selected channel flows during poor water quality conditions.
<ul style="list-style-type: none"> Increase enforcement of source control regulations for agricultural drainage to extensively: <ul style="list-style-type: none"> Reduce leachate concentrations and volumes. Restrict spray programs adjacent to waterways. Reduce runoff volumes Reduce the concentrations of pollutants in runoff. 	<ul style="list-style-type: none"> Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.
<ul style="list-style-type: none"> Coordinate incentives for developing efficient water management practices with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
<ul style="list-style-type: none"> Coordinate fallowing or retirement of agricultural lands with severe, costly drainage problems with <i>Water Supply Management</i> actions. 	<ul style="list-style-type: none"> Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
<ul style="list-style-type: none"> Implement moderate on-site mine drainage remediation measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants. 	<ul style="list-style-type: none"> Reduces future Delta and Sacramento River heavy metals loading.

Activities	Benefits
<ul style="list-style-type: none"> Study and implement actions to reduce effects of salinity in the San Joaquin River, to maintain water levels and circulation in the south Delta, and to reduce recycled salt load to the San Joaquin Valley. 	<ul style="list-style-type: none"> Better manage flow circulation. Increase water stages for the south Delta. Improve San Joaquin River and south Delta water quality.
Considerations	
<ul style="list-style-type: none"> Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries. Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc. Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements. Potential benefits of south Delta stage, circulation, and water quality actions need to be verified. Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution. Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately. 	

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> Acquire about 100,000 AF of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage. 	<ul style="list-style-type: none"> Transports fish through the San Joaquin River and Delta. Improves water quality. Improves management flexibility for diversions to reduce fish losses.
<ul style="list-style-type: none"> Improve CVP and SWP operations through predation control and coordinating operations. 	<ul style="list-style-type: none"> Reduces fish losses. Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
<ul style="list-style-type: none"> Improve real-time monitoring for presence of fish species of special concern and modify water diversions to avoid fish entrainment. 	<ul style="list-style-type: none"> Provides an additional tool to help reduce entrainment of special-concern species. Improves flexibility to divert water during critical fish migration periods.

Considerations

- San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.
- Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users.

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> • Mark salmon produced in hatcheries. 	<ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
<ul style="list-style-type: none"> • Increase hatchery production for fall run Chinook Salmon on the San Joaquin River or its tributaries. 	<ul style="list-style-type: none"> • Helps re-establish the natural fish run.
Considerations	
<ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> • Establish landside buffer zones adjacent to some levees on islands with deep peat soils. • Convert 8,000 to 12,000 acres of agricultural land on Delta islands below -10 feet of elevation to wetland habitat to implement a long-term subsidence management program. • On 15,000 to 20,000 acres of Delta islands between -10 and -3 feet of elevation, rotate seasonal wetlands with wildlife friendly agricultural practices to implement a long-term subsidence management program. 	<ul style="list-style-type: none"> • Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.

Activities	Benefits
<ul style="list-style-type: none"> Establish and recommend extensive funding for an emergency levee management program which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. Identify extensive funding sources for continuing levee maintenance activities beyond the planning horizon of this program. Identify funding sources for a continuing levee stabilization program that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard. 	<ul style="list-style-type: none"> Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. Provides funding for continued maintenance of levees to protect Delta functions. Increases the reliability for water supply needs from the Delta.
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee improvements and buffer zone programs. Buffer zones may be managed to provide wildlife habitat. Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin. Emergency levee management program would not replace other levee maintenance or improvement programs. Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other federal and state programs, including the Anadromous Fish Restoration Program. 	<ul style="list-style-type: none"> Provides additional habitat restoration. Provides coordination between habitat restoration programs.

Activities	Benefits
<ul style="list-style-type: none"> Establish a CALFED Regulatory Team to coordinate and expedite habitat restoration permits. 	<ul style="list-style-type: none"> Accelerates acquisition of permits for environmental restoration projects and other CALFED projects
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta. 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage and provide incentives for farmers and levee maintenance districts to leave habitat areas undisturbed through working with resource agencies. 	<ul style="list-style-type: none"> Protects existing habitats. Increases flexibility in maintenance programs.
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff. 	<ul style="list-style-type: none"> Improves Delta water quality by enforcing real economic penalties for discharge violations.
<ul style="list-style-type: none"> Coordinate with on-going or planned watershed management programs that promote and protect Delta water quality and fishery benefits. 	<ul style="list-style-type: none"> Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
<ul style="list-style-type: none"> Prioritize sources and pollutants of concern and direct enforcement activities accordingly. Coordination with other watershed management programs could include programs outside of CALFED's geographic scope. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Establish incentives for long-term conjunctive use in the Sacramento and San Joaquin valleys and ease institutional barriers. 	<ul style="list-style-type: none"> Reduces dry year demand for Delta water exports. Could make water available for transfers.

Activities	Benefits
<ul style="list-style-type: none"> • Long-term planning for drought contingencies. <ul style="list-style-type: none"> • Create a coordinated CALFED program to expedite and expand the use of water transfers to meet water needs during droughts. 	<ul style="list-style-type: none"> • Improve drought response planning. • Increases water supply reliability and predictability. • Can be integrated with conjunctive use program.
<ul style="list-style-type: none"> • Ease institutional barriers to facilitate water transfers. • Improve planning and coordination procedures for water transfers. • Improve operational procedures to facilitate water transfers. • Establish a water transfer brokering mechanism or institution. 	<ul style="list-style-type: none"> • Increases the efficiency of implementing water transfers. • Increases financial position of otherwise economically marginal development projects. • Improves water supply reliability, predictability, and flexibility.
<ul style="list-style-type: none"> • Improve coordination of land use and water supply planning. <ul style="list-style-type: none"> • Develop incentives for local and regional coordination of land use and water supply planning. • Implement long-term institutional measures to increase coordination of state/federal project planning and operation with local and regional water project planning and operation. 	<ul style="list-style-type: none"> • Provides greater flexibility for short-term transfer water during drought contingencies. • Increases the efficiency of water supply planning. • Ensures beneficial uses of existing water supplies.
Considerations	
<ul style="list-style-type: none"> • Determine institutional needs to implement long-term drought planning programs. • Determine institutional requirements for augmenting California Water Codes to facilitate water transfers. • Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows. 	